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Osseointegration Offers Amputees a Revolutionary New Option in Prostheses

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By AJ Simmons WRNMMC Command Communications



Navy Cmdr (Dr.) Jonathan Forsberg helped to conceive the DoD's Osseointegration program while heading the

Department of Regenerative Medicine at the Naval Medical Research Center (Photo Courtesy AJ Simmons)

In the past few years, the work in prosthetics at Walter Reed National Military Medical Center (WRNMMC) has taken continuous steps forward. One of the most significant steps in recent history was the development of one of the first American osseointegration programs in the field. The osseointegration program at WRNMMC, led by the work of Navy Cmdr. (Dr.) Jonathan Forsberg and Army Lt. Col. (Dr.) Kyle Potter, began its clinical trials in February of 2016 and placed its first compress-based, osseointegrated prosthesis in May of 2016.

"In the simplest terms, osseointegration refers to the direct skeletal attachment of a prosthesis," explained Potter. "So we're putting an implant into the bone and bringing it out through the skin."

Forsberg and Potter were first drawn to the field of prosthesis—which then led them to osseointegration.

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“Both Dr. Potter and myself noticed that there was a lack of osseointegration expertise within the Department of Defense (DoD), and we were well-positioned to bring that to the DoD,” said Forsberg.

While osseointegration in the DoD is still in its infancy as a program, Potter explained that the current advantages are considerable for patients who experience difficulty with conventional, socket-based prosthetics.

“A lot of discomfort and functional limitation are associated with socket-related problems,” said Potter. “[Osseointegration] gets rid of all socket related problems—whether it’s pain, ulceration, pinching, sweating or difficulties with socket fit and suspension.”

Potter also elaborated that there are additional benefits to osseointegration. By anchoring the prosthesis directly to the bone, patients are capable of much more articulate and precise movement of their prostheses. This also offers patients an improved sense of osseoproprioception—the ability to feel where their residual limb is in space without needing to look at it.

Forsberg explained that by bypassing the methods of socket-based prostheses, osseointegration can get patients out of wheelchairs and make them more functional. Additionally, through osseointegration, patients that prefer not to wear an upper-extremity prosthesis can use a more contemporary or even robotic device.

The osseointegration program at WRNMMC got its start in part from Forsberg’s work with Dr. Rickard Bränemark, a Swedish orthopedic surgeon who helped to pioneer the method with his research team.

“It’s a little out there, attaching a prosthetic to the skeleton,” said Forsberg. “But we’re standing on the shoulders of giants. The Swedish group has 20+ years of experience, and we’re lucky to have Rickard Bränemark as one of our most trusted advisors and collaborators.”

“Right now in the United States, osseointegration is really in its infancy,” said Potter. “And so we’re taking this in a very conscientious and stepwise fashion in terms of the progression of who we think this is best indicated for. What we’re really trying to do is provide the full spectrum of care to any service member with limb loss to optimize the functional capabilities of that individual.”

Part of the reasoning for this conscientious and stepwise approach, as Forsberg explained, is the unique nature of the patients that he and Potter treat.

“Not all osseointegrated implants are the same,” Forsberg pointed out. “Blast victims have unique anatomic considerations that we must take into account before we decide which implant is appropriate.” He noted that patients injured in blasts have a potentially higher risk of infection, and that requires that the osseointegration department proceed more carefully and pursue implants that are able to be revised in cases of infection.

As the field of osseointegration continues to develop in the United States, both Potter and Forsberg stress the importance of safety above all else.

“Right now we’re still in the process of determining if osseointegration is safe and efficacious in the military,” explained Forsberg. “Once we can define the complication profiles of osseointegration, we might be able to offer it to a wider range of patients, rather than only patients with high transfemoral amputations or transhumeral amputations.”

“We’re getting better all the time,” said Potter. “I think the first thing we have to do is show that this is safe and effective. We’re already working on iterations 2.0 and 3.0 to make the devices better and safer.”

As far as the future of the field, Forsberg and Potter hold high hopes for the continued progression and development of osseointegration while maintaining their consistent focus on safety at all times.

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“We want to help people,” said Potter. “And so I would like to see it grow, but grow in a controlled fashion so that we’re helping the maximum number of patients and hurting as few as possible, if any.”

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